

NSB-25

# Semi-Annual Status Report

July 1965 through January 1966

The paper "Effects of Neutral and Acid Polysaccharides on Natural Resistance of Mice to Bacterial Challenge" has been published. [REDACTED]

The operation described in the previous report on exclusion of the entire ileum as a "blind loop" has successfully demonstrated that the pancreatic enzymes are essential to the production of the hemorrhagic enteropathy of deep hypothermia.

During this period we have discovered and demonstrated the basic mechanism which leads to the fatal hemorrhagic enteropathy of prolonged deep hypothermia in rats and dogs. A paper incorporating this work will be ready for submission to "Gastroenterology" in about 3 weeks.

The pathogenesis is a consequence of cold inactivation of the Na<sup>+</sup> pump with consequent loss of cell volume control, especially serious for the enteric epithelium. Consequent to this is an osmotic explosion which sheds the gut epithelium. This exposes the unprotected gut to the luminal proteases with fatal results.

By replacing the succus entericus with a Na<sup>+</sup> free solution (sucrose) we can prevent shedding after one hour of incubation at 37° C. and 2½ hours at 0° C.

This mechanism of "osmolysis" we believe to operate in normothermic prolonged shock resulting in the same intestinal lesion, however the impairment of the ionic pumps are due to severe prolonged hypoxia. Hypoxia, we have demonstrated, plays no role in hypothermia.

Thus we believe the question of the "intestinal factor" in shock and hypothermia is now answered.

Work is soon to begin on this same principle as it may relate to radiation injury as well as other aspects of shock and hypothermia.

Initial results with prolonged hypothermia, treating the intestines according to the above principles are extremely interesting.

Very sincerely yours,

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